

WHAT IS CLAIMED IS

1. An image processor for embedding in image data an  
digital watermark including position and rotation  
information, using an irrotationally symmetric pattern  
5 arrangement.

2. The image processor according to claim 1,  
wherein said irrotationally symmetric pattern  
arrangement is a two-dimensional matrix constituted by  
10  $m \times n$  elements.

3. The image processor according to claim 1,  
wherein said irrotationally symmetric pattern  
arrangement is a pattern arrangement for which the  
15 positive or negative symbols of each corresponding  
elements are not wholly the same if the pattern  
arrangement is rotated at an arbitrary angle (except  
for angles of 360 degrees multiplied by an integer  
number).

20 4. An image processor capable of extracting digital  
watermark information from image data in which said  
digital watermark information including position and  
rotation information is embedded, comprising:  
25 rotation information searching means for  
performing processing for extracting said rotation  
information from the image data with said digital

watermark information embedded therein, for a plurality of rotation angles different from one another;

position information searching means for performing processing for extracting said position  
5 information from said image data, for a plurality of start-of-extraction positions different from one another;

calculating means for calculating confidence coefficients indicating accuracy as to whether said  
10 position and rotation information is extracted, for each information searched by said rotation information searching means and position information searching means and extracted as position and rotation information; and

15 determining means for determining the position and rotation angle at which said digital watermark information is embedded in said image data, based on the confidence coefficient calculated by said calculating means.

20

5. The image processor according to claim 4,  
wherein said digital watermark information includes said position information and rotation information and usage information, and

25 said usage information includes the ID of a device or the user ID.

6. The image processor according to claim 4,  
wherein said digital watermark information  
includes said position information and rotation  
information and usage information, and

5 said usage information includes information for  
controlling a device.

7. The image processor according to claim 4,  
wherein said calculating means calculates  
10 confidence coefficients by performing computation of  
said image data with a matrix constituted by  $m \times n$   
coefficients.

8. The image processor according to claim 7,  
15 wherein said matrix computation processing is  
convolution computation.

9. The image processor according to claim 4, further  
comprising:

20 extracting means for extracting the digital  
watermark information embedded in said image data,  
based on the position in said image data on the basis  
of the result of determination by said determining  
means.

25 10. An image processing method of embedding in an  
image digital watermark information including position

and rotation information, using an irrotationally symmetric pattern arrangement.

11. An image processing method of extracting digital  
5 watermark information from image data in which said digital watermark information including position and rotation information is embedded, comprising:

10 a rotation information searching step of performing processing for extracting said rotation information from the image data with said digital watermark information embedded therein, for a plurality of rotation angles different from one another;

15 a position information searching step of performing processing for extracting said position information from said image data, for a plurality of start-of-extraction positions different from one another;

20 a calculating step of calculating confidence coefficients indicating accuracy as to whether said position and rotation information is extracted, for each information searched in said rotation information searching step and position information searching step and extracted as position and rotation information; and

25 a determining step of determining the position and rotation angle at which said digital watermark information is embedded in said image data, based on

the confidence coefficient calculated in said calculating step.

12. A computer program product embodying a program for  
5 implementing an image processing method of embedding in  
an image digital watermark information including  
position and rotation information, using an  
irrotationally symmetric pattern arrangement.

10 13. A computer program product embodying a program for  
implementing an image processing method of extracting  
digital watermark information from image data in which  
said digital watermark information including position  
and rotation information is embedded,

15 the program comprising:

program codes for a rotation information searching  
step of performing processing for extracting said  
rotation information from the image data with said  
digital watermark information embedded therein, for a  
20 plurality of rotation angles different from one  
another;

program codes for a position information searching  
step of performing processing for extracting said  
position information from said image data, for a  
25 plurality of start-of-extraction positions different  
from one another;

program codes for a calculating step of  
calculating confidence coefficients indicating accuracy  
as to whether said position and rotation information is  
extracted, for each information searched in said

- 5 rotation information searching step and position  
information searching step and extracted as position  
and rotation information; and

- program codes for a determining step of  
determining the position and rotation angle at which  
10 said digital watermark information is embedded in said  
image data, based on the confidence coefficient  
calculated in said calculating step.

14. A computer data signal embodied in a propagating  
15 wave and used for implementing an image processing  
method of embedding in an image digital watermark  
information including position and rotation information,  
using an irrotationally symmetric pattern arrangement.

- 20 15. A computer data signal embodied in a propagating  
wave and used for implementing an image processing  
method of extracting digital watermark information from  
image data in which said digital watermark information  
including position and rotation information is embedded,  
25 comprising:

code signals for use in a rotation information  
searching step of performing processing for extracting

said rotation information from the image data with said digital watermark information embedded therein, for a plurality of rotation angles different from one another;

5           code signals for use in a position information searching step of performing processing for extracting said position information from said image data, for a plurality of start-of-extraction positions different from one another;

10           code signals for use in a calculating step of calculating confidence coefficients indicating accuracy as to whether said position and rotation information is extracted, for each information searched in said rotation information searching step and position  
15 information searching step and extracted as position and rotation information; and

            code signals for use in a determining step of determining the position and rotation angle at which said digital watermark information is embedded in said  
20 image data, based on the confidence coefficient calculated in said calculating step.